4.6.3 Approving the Work Plan

If the CO determines that the work plan adequately addresses all EPA requirements, the CO approves it and informs the contractor. The RPM may need to adjust the WA expenditure limit following work plan approval to make available funding sufficient to begin the RD. Adjustments to the expenditure limit are indicated on the WAF and approved by the CO.

OSWER Directive 9202.1-12, "Guidance on Roles and Responsibilites for Preparing Independent Government Cost Estimates (IGCEs) for Remedial and Enforcement Work Assignments," July 27, 1993, and EPA 540/R-94/022 and 103, "Response Action Contract (RAC) Users' Guide, volumes 1 and 2," provide additional information on approving the work plan, including information on conducting and documenting work plan negotiations.

4.7 Overseeing the Design Development

The design development phase includes all activities relating to the review and approval of all design efforts, including preliminary, intermediate, prefinal, and final design phase submittals. The government must review all deliverables to ensure that it is receiving goods and services commensurate with the costs billed. The contracting party (EPA or USACE), therefore, must review all design submittals.

This section provides descriptions of many of the design deliverables and details EPA review procedures associated with each of the submittals. The RPM is responsible for ensuring that all submittals are delivered and reviewed in a timely manner to prevent delays in the project schedule. The RPM also is expected to manage his or her design oversight activities and balance federal, state, and community relationships.

This section describes:

- Design review procedures
- Predesign phase submittals
- Treatability screening submittals
- Preliminary design phase submittals
- Intermediate design phase submittals
- Prefinal/final design phase submittals

4.7.1 Design Review Procedures

The RPM review procedures may be conducted in parallel or in series with other ongoing design activities. Parallel reviews are conducted while other design work continues and eliminate inefficiencies and delays caused by work interruptions. Parallel reviews, however, are not appropriate in all circumstances because the work performed may have to be repeated if the review results indicate that the design effort is not proceeding in the desired direction. In a serial review, subsequent design activities do not begin until the review is completed, all comments are resolved, and approval to proceed is granted.

The RPM is responsible for coordinating the review of all contractor deliverables when EPA is the contracting party. The RPM must review submittals that are within his or her breadth of knowledge and experience and distribute all other submittals to the TRT. A copy of the submittals must be submitted to the designated state officials for their review. The RPM also may provide copies of the submittals to the potentially responsible parties or technical assistance grant contractors hired by the community. The RPM collects TRT comments and any additional relevant suggestions, resolves conflicting comments, consolidates the comments into a single report, and provides the results of the review to the contractor.

The RPM, during EPA-lead designs, is involved with scheduling a post-submittal meeting that includes all involved parties, including the TRT and state officials, after every major design submittal. The purpose of the meeting is to reach consensus on remaining design submittal issues. The RPM must designate someone to take meeting notes and document resolution of the issues.

The contractor must respond to all EPA comments and indicate whether the comment was incorporated or provide an explanation for excluding it. The contractor has a professional responsibility to inform the RPM of any unintended or adverse effects that result from incorporation of EPA comments into the design. The RPM should ensure that the contractor response to EPA comments is provided according to the schedule in the work plan.

The RPM also may coordinate the review of contractor deliverables as part of the IAG with

USACE. If USACE is the contracting party and the RPM is facilitating the EPA review, the RPM must follow USACE review procedures. If the RPM is not coordinating the review of contractor deliverables, the RPM should participate in the review as a member of USACE's review team. These procedures should have been resolved as part of the IAG SOW.

The duration of review activities for any particular project is a function of the site characteristics, the complexity of the design, and EPA or USACE administrative requirements. The specific review and approval milestones should be identified clearly in the project schedule. All involved parties should be aware of the consequences resulting from unnecessary delays.

There are a number of concerns that must be incorporated into a thorough RD review. Information on biddability, operability, constructability, claims prevention, and environmental reviews and a design review checklist are included in **Appendix C**. These reviews provide a more systematic approach to the design review process and, although experienced reviewers include many of these features as part of their review, the RPM should consult the specific review information to ensure a thorough review.

4.7.2 Predesign Phase Submittals

Several plans must be submitted by the design contractor before any on-site field activities are initiated. The design contractor must submit an RD work plan to describe its proposed approach to completing each project task (see section 4.6). The following additional plans may be submitted either with the contractor's work plan or shortly thereafter:

- Site management plan
- Health and Safety Plan (HASP)
- Sampling and Analysis Plan (SAP)
- Contingency plan

Site Management Plan

The site management plan details the security provisions to be taken during the RD. Security provisions include:

- Methods for limiting access to the site
- Secure waste disposal practices
- Management responsibilities

Site security is a concern particularly when equipment is left on-site during RD field activities. The RPM should ensure that the contractor is tasked with periodic site security inspections and that there exists a means of maintaining (or enhancing, if necessary) existing security features. Site security becomes more important during the RA for two reasons: additional equipment could increase the likelihood of site vandalism; and there is a potential for danger to trespassers as a result of the construction activities.

Health and Safety Plan

The Occupational Safety and Health Administration (OSHA) regulations require that a single written occupational, safety, and health program that includes a HASP be in place for remedial activities at all Superfund sites. There should be one HASP per site, *not* one HASP per contractor, and every site employee should be provided with a copy. The objective of the plan is to protect workers through the identification, evaluation, and control of health and safety hazards and to provide for emergency response contingency planning. While EPA uses the acronym HASP, OSHA uses the term safety and health program or plan, and USACE uses site safety and health plan. The required contents of the plans are similar.

The contents of a HASP must include (but are not limited to) the requirements of 29 *Code of Federal Regulations* (*CFR*) 1910.120 for hazardous waste operations. The standards outlined in 29 *CFR* 1910.120, referred to as Hazardous Waste Operations and Emergency Response (HAZWOPER) standards, contain specific requirements to minimize the health and safety hazards associated with actions at uncontrolled hazardous waste sites. In addition, the HASP also may include other OSHA safety standards for traditional construction activities. **Figure 4-6** outlines the general contents of the HASP, incorporating only the HAZWOPER standards. To create the HASP, the HASP developed for the RI/FS may be reused or updated.

Only the hazardous portions of site cleanups fall under HAZWOPER standards. Designating areas as nonhazardous, and therefore not subject to HAZWOPER, results in a more cost-effective

Figure 4-6

Components of the HASP

- Key personnel and hazard communications plan
- Health and safety risk analyses
- Site control measures
- Employee training assignments
- Medical surveillance
- Personal protective equipment
- Air and personnel monitoring
- Spill containment program
- Confined space entry procedures
- Decontamination procedures
- Emergency response plan

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cleanup and enables more firms to compete for those portions of the construction work. OSHA standards, not cleanup levels, determine hazardous exposure levels. The designation of nonhazardous areas must be made by professionals competent in worker health and safety.

Emergency Response Plan

The emergency response plan (ERP) is a required element of the HASP and includes a description of how to handle potential site emergencies and how to minimize the risks associated with a response. The ERP must be developed and implemented *before* commencing operations at a site. The required elements of the ERP are codified in 29 *CFR* 1910.120(1)(2).

The ERP must include information on site topography, layout, prevailing weather conditions, and procedures for reporting incidents to local, state, and federal agencies. The ERP must be included in overall site operation training programs and must be reviewed and rehearsed regularly. The plan also must remain available on-site for employee, OSHA, and other government agency review.

The ERP should incorporate the capabilities and limitations of the local emergency response community and the local community's contingency plan, which should be developed by the Local Emergency Planning Committee (LEPC). The Superfund Amendments and Reauthorization Act Title III, or the Emergency Planning and Community Right-to-Know Act, requires local governments to create LEPCs. LEPCs should have in place local contingency plans for coordinating police, fire, utility, and medical services.

The local emergency responders should be involved early on in efforts to develop the ERP so they are familiar with their roles in a site emergency. Once it is completed, copies must be provided to the local emergency response facilities.

RPM's HASP Responsibilities

The RPM must review the HASP when an EPA contractor is tasked with the RD or RA. To conduct this review, the RPM should consult a health and safety contractor or USACE to have the HASP reviewed by a certified industrial hygienist. For USACE-managed RDs and RAs, USACE is responsible for reviewing and approving the HASP.

It is the contractor's responsibility to comply with all OSHA requirements, including the HASP. OSHA personnel ensure contractor compliance by performing periodic safety inspections. It is the RPM's responsibility to ensure that the contractor implements the HASP. To effectively carry out this responsibility, an RPM may use the following techniques:

- Inquire about health and safety activities at every progress meeting. Let it be known that health and safety is an important criterion when rating contractor performance.
- Review the site files for HASP revisions. HASPs are evolving documents that must be revisited continually and modified as necessary. If the cover is dusty, chances are that the HASP is not being followed.
- The RPM can contact the TRT or EPA's Emergency Response Team (ERT) in Edison, New Jersey, for advice if there is a question on whether the HASP is being implemented properly. The ERT is the national Superfund lead on all health and safety issues related to site cleanup. The RPM also has the option of contacting OSHA for a compliance inspection.

The RPM, as EPA's representative, must maintain effective community relations, according to the *National Contingency Plan*. During the predesign phase, the RPM should contact the LEPC to coordinate the community's local contingency plan

with the ERP. The RPM should obtain a preliminary agreement with the community to provide emergency response services as part of the ERP.

The RPM also should facilitate the incorporation of the community's concerns during the development of the ERP. The RPM must ensure that the local response community is equipped to handle their respective roles. All emergency responders must have a level of training comparable to the job they will be performing. This requirement generally translates into a minimum of 24 hours of training. Failure to initiate discussions with the community early in the RD process may affect the overall project schedule and lead to a breakdown in community relations. Although the RPM should establish initial contact regarding the use of local emergency response units, the final agreement is the contractor's responsibility and is the constructor's responsibility during the RA because the ERP is part of the HASP and the HASP is the contractor's responsibility.

Publication 9285.1-03, "Standard Operating Safety Guides," June 1992; EPA/540/G-89/010, "Health and Safety Audit Guidelines"; Publication 9285.1-02, "Health and Safety Roles and Responsibilities at Remedial Sites," July 1991; and Publication 9285.6-08FS, "Emergency Responder Agreements for Fund Lead RAs," March 1994, provide additional information on health and safety requirements at Superfund sites.

Sampling and Analysis Plan

The SAP is a report that details the methods and procedures concerning analytical methods employed during site-related sampling and data evaluation. The SAP incorporates the information from two separate but related reports: the field sampling plan (FSP) and the quality assurance project plan (QAPP). These two reports may be submitted separately, but generally are submitted together as the SAP.

The purpose of data collection during the RD is not to recharacterize the site but to obtain physical data to support the design effort. The RPM must ensure that the SAP is adequately reviewed by personnel with the appropriate experience and qualifications who are familiar with the RD information requirements and who can identify unnecessary procedures.

Field Sampling Plan

The FSP details the sampling and analytical procedures and methodologies the contractor or designated subcontractor will use and should be written so that a field sampling team unfamiliar with the site is able to collect the required samples and field information. The FSP specifies how many samples will be taken, how and where they will be collected, what technical means will be employed to collect them, what technical methodologies and procedures will be used to analyze the samples, and how the investigation-derived waste will be disposed. The FSP also should contain an analysis of the specific data gaps that the plan is designed to eliminate. **Figure 4-7** lists the contents of the FSP.

Figure 4-7

Field Sampling Plan Contents

- Site background
- Sampling objectives
- Sample location and frequency
- Sample designation
- Sampling equipment and procedures
- Sample handling and analysis
- Investigation-derived waste disposal procedures

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There is a tendency for contractors to mistrust data collected by others, regardless of its quality. Resampling often is not necessary and only increases the time and cost of the RD. It should be avoided unless serious inadequacies in the existing data can be demonstrated. SAP reviewers should be instructed to note any unnecessary sampling or analyses.

Quality Assurance Project Plan

The quality assurance project plan (QAPP) provides a blueprint for the QA/QC activities during the sampling and analysis phases of the project that are needed to produce environmental data of the type and quality required for the project. The QAPP augments the FSP by incorporating the design of the sampling and analysis events based on a systematic plan developed using the data quality objectives (DQOs) process. The DQO process enables the designers and the users to create a sampling design that, when implemented, will yield a dataset of values within acceptable limits of error

specified by the user. DQOs are qualitative and quantitative statements derived from the DQO process that clarify study technical and quality objectives, define the appropriate type of data, and specify tolerable levels of the potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions. The DQO process is a systematic strategic planning tool based on the scientific method that identifies and defines the type, quality, and quantity of data needed to satisfy a specified use. The key elements of the process include:

- Concisely defining the problem
- Identifying the decision to be made
- Identifying the key inputs to that decision
- Defining the boundaries of the study
- Developing the decision rule
- Specifying tolerable limits on potential decision errors
- Selecting the most resource efficient data collection design

The QAPP should address, as a minimum, the elements listed in **Figure 4-8**. If a particular element is not required, the QAPP should record why. Since some of the information required for the RD QAPP may be contained in previous site-specific QAPPs, it will be necessary only to reference those earlier approved QAPPs. Duplicate information does not need to be repeated.

EPA QA/R-5, "EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations," and OSWER Directive 9355.3-01, "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA," provide additional information on preparing QAPPs and FSPs. CERCLA-specific guidance on applying the DQO process to remedial activities may be found in EPA 540-R-93-071, "The Data Quality Objectives Process for Superfund: Interim Final Guidance," September 1993.

Contingency Plan

The contingency plan is written to protect the local affected community in the event of an accident or emergency. It may incorporate an air monitoring plan and a spill control and countermeasures plan, if applicable, for the site. The following is a preliminary list of items that could be included in a contingency plan:

- Name of person responsible for responding in the event of an emergency incident.
- Plan and date for meeting with the local community, including local, state and federal agencies involved in the cleanup, as well as local emergency squads and hospitals.
- First aid and medical information including names of personnel trained in first aid; map with the locations of medical facilities clearly marked; all necessary emergency phone numbers; fire, rescue, local hazardous material

Figure 4-8

Suggested Format for the QAPP

- Title and Approval Sheet
- Table of Contents
- Distribution List
- Project/Task Organization
- Problem Definition/Background
- Project/Task Description
- Quality Objectives and Criteria for Measurement of Data
- Special Training Requirements or Certifications
- Required Documentation and Records
- Sampling Process Design (Experimental Design)
- Sampling Methods Requirements
- Sample Handling and Custody Requirements
- Analytical Methods Requirements
- Quality Control Requirements
- Instrument/Equipment Testing, Inspection, and Maintenance Requirements
- Instrumentation Calibration and Frequency Requirements
- Inspection/Acceptance Requirements for Supplies and Consumables
- Data Acquisition Requirements (Non-Direct Measurements)
- Data Management Requirements
- Required Assessments and Response Actions
- Required Reports to Management
- Data Review, Validation, and Verification Requirements
- Validation and Verification Methods
- Reconciliation with User Requirements

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teams; and National Emergency Response Team.

- Air monitoring plan—Air monitoring will be necessary at any site when the site-specific risk assessment specifies a risk via the inhalation/air transport pathway. This section details the minimum requirements for air monitoring both onsite and at the perimeter of the site. The chemical constituents identified at the site as part of the risk assessment should be the basis for pollutant sampling and measurement of atmospheric pollutants. Air monitoring may include personnel monitoring, on-site or off-site area monitoring, and perimeter monitoring. Trigger concentrations to implement the contingency plan should be specified.
- Spill control and countermeasures plan—This plan will provide contingency measures for potential spills and discharges from materials handling or transportation. It describes methods, means, and facilities required to prevent contamination of soil, water, atmosphere, uncontaminated structures, equipment or material from the discharge of waste due to spills; provides for equipment and personnel to perform emergency measures required to contain a spill and to remove and properly dispose of any media that become contaminated due to spillage; and provides for equipment and personnel to perform decontamination measures that may be required to remove spillage from previously uncontaminated structures, equipment, or material.

4.7.3 Treatability Studies

A treatability study is a laboratory or field test designed to provide critical data needed to evaluate and support the design of one or more treatment technologies. Treatability studies usually should be conducted during the remedy evaluation phase of the RI/FS and include a three-tiered approach: (1) laboratory screening; (2) bench-scale testing; and (3) pilot-scale testing.

The only function of a treatability study during the RD is to provide the quantitative design and cost data required to optimize critical design parameters. The earlier laboratory screening and bench-scale testing procedures performed during the RI/FS are used to determine if a remedy will work and most likely will be adequate to allow an RD treatability study to begin with the pilot-scale test. Pilot-scale testing provides an evaluation of the following types of information:

- Full-scale performance
- Treatment train performance
- Materials handling characteristics
- Process upsets and recovery
- Sidestream and residuals generation
- Energy and reagent usage
- Site-specific considerations such as heavy equipment access, waste-feed staging space, and local availability of equipment and qualified personnel

Figure 4-9 provides a suggested pilot-scale treatability study work plan format.

Figure 4-9

Suggested Contents for a Pilot-Scale Treatability Study Work Plan

- Project description
- Cost estimates/schedule
- Test objectives
- Treatability study work plan
- Pilot plant installation and setup
- Pilot plant operation and maintenance procedures
- Parameters to be measured
- Sampling plan
  - Analytical methods
  - Data management
  - Data analysis and interpretation
- Subcontractor's HASP
- Residuals management plan
- Subcontractor's contract management

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Pilot-scale testing is expensive (averaging $225,000 to $1 million per site) and often can be avoided by relying on alternative means for collecting performance data. Contractors bidding on the RA contracts and technology vendors marketing waste treatment systems frequently include detailed

performance-based specifications in their bids. Potential RA contractors include detailed information about their processes. Vendors may be allowed to remove small amounts of site waste to test the application of their technologies. The data available from these sources may satisfy the designer's data needs and avoid the additional time and expense of conducting a pilot study.

Overseeing Treatability Study Progress

For EPA-managed RDs, the RPM must monitor contractor oversight of the treatability study subcontractor. The RPM, however, must not contact the subcontractor directly to discuss EPA concerns. All contact with the subcontractor must be coordinated through the contractor.

For USACE-managed RDs, USACE ensures the treatability study is completed, if necessary, and will report the study progress to the RPM. USACE must notify the RPM if the results of the treatability study affect the ROD, RD cost, or RD schedule.

The RPM will oversee the ARCS/RAC contractor or USACE performance of the following activities:

- Procuring the treatability study subcontractor, test facility, equipment, and materials
- Procuring outside laboratory services, if necessary for performance analysis
- Establishing an on-site field laboratory to facilitate analysis of test samples
- Obtaining samples as specified in the work plan
- Testing equipment to ensure proper operation
- Analyzing test samples
- Evaluating test results and preparing results report

Reviewing the Treatability Study Evaluation Report

The RD contractor submits a treatability study evaluation report at the conclusion of the treatability study. The report provides detailed information regarding the effectiveness of the treatment technology when compared with the performance standards established for the site by the ROD. The report evaluates the effectiveness, implementability, cost, and actual results and compares them with the predicted results. The report also evaluates full-scale application of the technology, including a sensitivity analysis identifying the key parameters affecting full-scale operation (i.e., how the unit will be scaled from pilot-scale to full-scale and how unknown factors may affect the design). The report describes the usefulness of the treatability study results as optimum design parameters.

The RPM reviews the evaluation report using the same methods used to review any contractor deliverable, including using the TRT. The RPM also should consider the benefits of a project review meeting with the contractor to allow the contractor to present the results of the treatability study and to summarize the current status of the RD.

Maintaining Effective Community Relations During the Treatability Study

The RPM must maintain effective community relations during an on-site treatability study. The RPM should augment the community relations plan (see section 3.12) to address any unique issues related to the proposed testing. These issues may include the potential for off-site air emissions, transportation of hazardous materials, noise levels, increased traffic, and other issues that affect the community.

The RPM, after consultation with the Community Relations Coordinator, may consider including additional public availability sessions, visitor's days, or other outreach methods to explain the proposed testing. A fact sheet describing the activity with a section that specifically addresses any potential community concerns or a briefing with the local public officials also may be useful.

OSWER Directive 9380.3-10, "Guide for Conducting Treatability Studies Under CERCLA," December 1989, provides additional information on performing treatability studies.

4.7.4 Preliminary Design Phase

The preliminary design phase is considered complete when approximately 30 percent of the design work has been completed. The preliminary design phase is an active phase and requires close RPM supervision. For EPA-managed RDs, the RPM should schedule a meeting with the RD contractor to begin the preliminary design phase. Due to the logical progression of the engineering design process, certain preliminary design phase submittals

are conceptual documents that must be completed and approved before successive preliminary design phase documents are begun.

The contracting party (EPA or USACE) is required to review and approve numerous preliminary drawings and specifications that build upon the design foundation established by the predesign phase submittals (see section 4.7.2). The preliminary design phase submittals include:

- Design criteria report
- Basis of design report
- Preliminary drawings and specifications
- Results of value engineering (VE) screen
- Preliminary RA schedule
- Preliminary RA and operation and maintenance (O&M) cost estimates

This section describes the preliminary design phase submittals and procedures for reviewing and approving them. **Figure 4-10** outlines preliminary design phase submittal components.

Figure 4-10

Preliminary Design Phase Submittal Components

- Design criteria report
  - Project description
  - Design requirements and provisions
  - Preliminary PFDs
  - O&M provisions
- Basis of design report
  - Design assumptions
  - RA contracting strategy
  - Permits plan
  - Preliminary easement/access requirements
  - Preliminary P&IDs
- Preliminary drawings and specifications
  - Outline of general specifications
  - Drawings and schematics, including final P&IDs
  - O&M requirements
  - Chemical and geotechnical data
- Results of VE screen
- Preliminary RA schedule
- Preliminary RA and O&M cost estimates

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EPA and USACE use different procedures and identify designer submittals by different names. The submittal names also may vary among Regions. The RPM, therefore, should know the functions of the submittals rather than the submittal titles. At times, the design criteria report and the basis of design report may be submitted as a single report.

Design Criteria Report

The design criteria report describes the technical parameters upon which the design will be based. The design contractor must submit and await contracting party approval of the design criteria report *before* expending additional design effort. This allows the contracting party to determine if the contractor is correctly interpreting and translating ROD performance standards, applicable or relevant and appropriate requirements (ARARs), and engineering standards and codes into site-specific engineering parameters.

The design criteria report may contain the following elements:

- Project description
- Design requirements and provisions
  - Waste characterizations
  - Technical design standards that the completed project is expected to meet
  - Complete description of how ARARs, pertinent codes, and standards will be translated into engineering parameters
  - Technical factors of importance to the design and construction, including currently accepted environmental control measures, constructability, and the use of currently acceptable construction practices and techniques
- Preliminary process flow diagrams (PFDs) for the treatment processes under design that identify all process significant components within the treatment train(s), the stream properties, and additional information as needed, including an integral chart showing stream properties and heat and material balances. The PFDs should include:
  - Pretreatment requirements
  - Volume and types of media requiring treatment

  - Treatment schemes (includes all media and by-products)
  - Input/output rates of flow streams
  - Influent/effluent qualities of flow streams (temperatures, pH, concentrations, etc.)
- O&M provisions that will have a significant influence on design approach (e.g., unattended operation, remote output of instrumentation signals, process data logging requirements, etc.)

Basis of Design Report/Design Analysis Report (USACE)

The basis of design report is a detailed description of the analyses conducted to select the design approach. The basis of design report, referred to as the design analysis report by USACE, may include the following elements:

- Summary and detailed justification of design assumptions
- RA contracting strategy
- Permits plan
- Identification of easement and access requirements
- Preliminary piping and instrumentation diagrams (P&IDs)

Summary and Detailed Justification of Design Assumptions

The basis for making the necessary design assumptions must be clarified for future reference. The necessary clarification requires that the designer provide:

- Calculations supporting the assumptions (e.g. unit sizing, feed rates, etc.) and references to any software programs used to model data
- Material and energy (or heat) balance
- Evaluation of how ARARs will be met
- Plan for minimizing negative effects on the environment and community during the construction and O&M phases

RA Contracting Strategy

The designer submits an RA contracting strategy detailing the qualifications that will be expected of the RA contractor. The strategy plan provides the information necessary to procure an RA contractor with any unusual experience, skills, or equipment that may be incorporated into the design.

Permits Plan

The permits plan details how requirements for all permits needed to implement the RA will be obtained and satisfied. The plan identifies required off-site disposal and discharge permits, the time required to process the permit applications, and a schedule for submitting permit applications. Where permits are not required for on-site activities due to federal exemptions, the substantive requirements of the permit(s) that would otherwise be required must be detailed (see section 3.7.1).

Identification of Easement and Access Requirements

The property surrounding a site that is needed for site access, RA staging areas, or other remediation purposes must be identified early in the design process. Failure to secure the necessary property through acquisition or access agreements may prevent the lead agency from procuring the RA constructor and will delay the commencement of RA activities (see section 3.7.1).

Preliminary P&IDs

The preliminary P&IDs expand upon the PFDs that were submitted with the design criteria report and later revised. The P&IDs become the foundation for the remainder of the design.

Preliminary Drawings and Specifications

The contracting party also must review all preliminary drawings and specifications. These include:

- An outline of general specifications
- Drawings and schematics, including final P&IDs
- A description of the planned O&M requirements
- All chemical and geotechnical data

Outline of General Specifications

The outline details the specifications that will be prepared and submitted as part of future RD submittals. The specifications must conform to the CSI format when designs are conducted under EPA contracts. USACE has developed its own format,

outlined in ETL 1006, *Technical Requirement for Pre-design and Design Submittals*, as well as the standardized design specifications listed in Figure 4-3, which are available from USACE's Huntsville Construction Division.

Drawings and Schematics

The type and number of drawings depend on the remedy selected. At this stage in the design, only the PFDs and P&IDs will be submitted in final form. These submittals shall include but are not limited to:

- A complete list (drawing register) of all drawings and specifications that will be produced through the end of the design
- Facility representations, including final PFDs and P&IDs and preliminary site and utilities layouts
- The site layout, existing site plan, utilities layouts, and demolition plans

Planned O&M Requirements

The anticipated O&M requirements following the completion of the RA must be described so that the RPM and state have access to the information and understand their expected future role in site remediation.

Chemical and Geotechnical Data

All data used to develop the design or be included in the RA contract documents shall be presented in a tabulated format. The sources of the data also must be identified.

Results of Value Engineering Screen

The VE screening includes an evaluation of the relationship between cost and function in the RD, with an emphasis on high cost areas. VE screening results are presented as a recommendation supporting or rejecting the need for a full-scale VE study. The VE screen should be performed as soon as possible during the preliminary design to avoid the time and expense of significant redesign resulting from the VE study. The VE study is discussed further in section 4.8.

Preliminary RA Schedule

The preliminary RA schedule must be appropriate to the size and scope of the anticipated activities and must include an evaluation of a phased approach to expedite the RA. The preliminary RA schedule should be one of the final preliminary design phase submittals, with the exception of the preliminary RA cost estimate, to allow the appropriate design personnel sufficient time to evaluate the design and prepare a reasonably accurate RA schedule.

Preliminary RA and O&M Cost Estimates

The preliminary RA cost estimate must include all costs necessary to arrive at a current working estimate (CWE). The CWE is a detailed bottom-up cost estimate developed from design documents and serves as the basis for all future (intermediate or prefinal/final) stage estimates and the RA IGCE. The CWE must include the estimated contract cost (including contractor direct labor, equipment, and material costs, overhead, profit, and bond), allowance for applicable contingencies (during both design and construction), escalation to midpoint of construction, appropriate escalation of operating costs, allowances for construction management, engineering during construction, as-builts, and other pertinent allowances.

The estimate should be prepared with as much detail as design documents allow. At the preliminary project stage, however, the design is only about 30 percent complete. Thus, design contingencies (i.e., construction contingencies during design) normally will be higher at this stage than for intermediate or prefinal/final design project stages. Cost allowances also must be made for construction features yet to be included in the design. New WAs issued under RACs will require the contractor to develop RA cost estimates using the USACE's work breakdown structure and MCASES-Gold software. This requirement is written into the RA Model SOW provided in **Appendix E.**

The preliminary RA cost estimate should be as accurate as the available information allows. The final cost for simple projects may be as much as 40 percent higher or 20 percent lower than the preliminary cost estimate and as much as 50 percent higher or 30 percent lower for complex projects. This estimate should be more refined than the ROD estimate. USACE has developed specific hazardous, toxic, and radioactive waste (HTRW) cost engineering guidance, which outlines in detail procedures for preparing HTRW cost estimates. This

information is provided in the reference materials listed below.

The O&M cost estimate will generally include operating labor (wages, salaries, training, overhead, and fringe benefits associated with post-construction operations); maintenance material and labor (labor, parts, and materials required to perform routine maintenance of facilities and equipment); auxiliary materials and energy (chemicals, fuel, electricity, water, sewer, etc. needed for plant operations); purchased services (sampling costs, laboratory fees, and other professional services); administrative costs; insurance; taxes; and licenses (property taxes, permit renewals, reporting).

The preliminary RA and O&M cost estimates generally will be the final preliminary design phase submittals, which allows the designer's cost estimator time to evaluate the RD, schedule, and O&M requirements and prepare reasonably accurate cost estimates.

Reviewing the Preliminary Design Phase Submittals

The lead agency is responsible for reviewing preliminary design phase submittals. In-depth reviews should be conducted by professionals experienced in the disciplines covered by the design. The submittals are the basis for all remaining design activities and, therefore, must be reviewed thoroughly by the contracting party to avoid costly and time-consuming redesigns later in the RD. The technical review must focus on the design criteria analysis and basis of design reports first. These reports provide an overview of the design and establish the tone for the remaining design effort.

At a minimum, the review should focus on the following:

- Assuring that the engineering design parameters correctly incorporate the ARARs and other ROD requirements
- Verifying that unit processes are being employed by the treatment train
- Confirming that the standards for efficient removal or treatment are reasonable for both the process and for waste volumes and concentrations
- Checking that process waste streams are adequately identified and addressed and that flow rates are appropriate
- Verifying that proposed siting of the process is appropriate and that any site abnormalities have been addressed
- Checking design calculations thoroughly enough to assess professional quality of design activity
- Completing a preliminary design biddability, constructability, and operability and an environmental and claims prevention screening (see **Appendix C**).

For EPA-managed RDs, the RPM must collect all TRT comments and forward them to the contractor. As specified in the SOW, the contractor shall review and formally respond to each comment. USACE-managed site-specific contracts also require the contractor to respond to all review comments.

The RPM must update CERCLIS as the RA cost estimate and schedule is refined. Updating and maintaining the information in CERCLIS facilitates effective communication between the RPM, PO, and CO and helps ensure that RA funds will be available as needed.

USACE Engineering Regulation 1110-3-1301, "Cost Engineering Policy and General Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) Remedial Action Cost Estimates," and Technical Manual 5-800-2, "Construction Cost Estimates," provide information on preparing RA cost estimates.

4.7.5 Intermediate Design Phase

The RD enters the intermediate design phase following the completion of the preliminary design. Approximately 60 percent of the design effort is completed before the intermediate design phase ends. All data collection and analysis should be completed and approved by the contracting party before the intermediate phase of the RD process begins. During the intermediate design period, the drawings and specifications submitted at the preliminary stage are completed and new, more detailed or later-phase documents are begun. Many of the deliverables, therefore, are refined preliminary

Figure 4-11

Intermediate Design Phase Submittal Components

- Revised design criteria report, if necessary
- Revised basis of design report, if necessary
- Intermediate drawings and specifications
  - Preliminary specifications
  - Drawings and schematics
  - O&M requirements
  - Unit price lists for the RA
  - Chemical and geotechnical data
- VE study results
- RA schedule
- Intermediate RA and O&M cost estimates

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design deliverables, while some are submitted for the first time. **Figure 4-11** outlines the major components of the intermediate design phase.

Less complex projects may not require a formal intermediate design phase or the associated submittals. In these cases, the RPM may consider substituting an in-progress review for the intermediate design phase submittals. This should be done only when it is apparent intermediate design phase submittals are unnecessary.

Revised Design Criteria Report

The design criteria report is updated and modified only if necessary and should not be modified extensively during the intermediate design phase. Major modifications should be addressed during the preliminary design phase and, for all practical purposes, should be complete at the preliminary submittal stage. VE study results, however, may affect the design if proposed VE changes are incorporated. Design changes will affect the contents of the design criteria report.

Revised Basis of Design Report

The basis of design report also is updated and modified where appropriate. Like the design criteria report, the basis of design report should not be modified extensively during the intermediate design phase with the possible exception of the permits plan and the easement/access requirement components of the report. These components must be updated throughout the design process because they are subject to change as the design progresses. As with the design criteria report, proposed VE changes would affect the basis of design report.

Intermediate Drawings and Specifications

During the intermediate design phase the preliminary drawings and specifications are further refined and additional information and reports are completed. The intermediate drawings and specifications include:

- Draft specifications
- Drawings and schematics
- Revised O&M description and cost estimate
- Unit price lists for the RA
- Chemical and geotechnical data

Draft Specifications

The contractor is required to submit draft specifications for construction, installation, site preparation, and field work standards, including an equipment startup and operator training plan. All specifications shall conform to CSI format (USACE-managed RDs will follow the USACE ETL 1006, *Technical Requirement for Pre-design and Design Submittals* specifications). The contractor should prepare new specifications only where guidance does not exist in EPA/USACE guide specifications or from previous RDs.

The technical specifications governing major process-significant or complex components of the proposed treatment systems should include requirements for the technology vendor to provide visits by experienced factory representatives to supervise the installation, adjustment, startup, and operation of the treatment systems.

Drawings and Schematics

The intermediate design package will build on the work presented during the preliminary design. The type and number of drawings and specifications depend on the remedy. The drawings may include but are not limited to:

- A current drawing register that lists every drawing and specification that will be produced during the project and the current status (revision number and date) of each document

- A revised PFD, if necessary (the PFD should be finalized during the preliminary design phase)
- Revised P&ID(s), if necessary (the P&IDs should be finalized during the preliminary design phase)
- Facility drawings (grading and paving, foundation plan and sections, piping plan and sections, structural plan and elevations, electrical schematics and plans, conduit routings, instrumentation and cable plan details, piping isometrics, etc.)
- A process-control logic table describing how all of the individual components of the process system are interrelated
- All utilities drawings depicting electrical, sewage, waste, gas, telephone, water lines, etc.
- Site layouts, existing site plan, contour maps, and physical features of the site
- Site work zones (for establishing worker protection zones) and date for verifying the location of clean zones
- Plans for flood protection, excavation, demolition, site clearing and grubbing, and work limits

Revised O&M Description

As the design is refined, the actual O&M requirements become more established. The RPM should present O&M requirements to the state as the information is made available.

Unit Price Lists for the RA

The contractor must provide the unit price or lump sum pricing lists for each bid item.

Chemical and Geotechnical Data

All data used to develop the design should be included in the RA contract documents, presented in a tabular form. The sources for all data and any uncertainties also must be identified.

Results of VE Study

The RPM should be aware of VE study results. After the VE study report is produced, any proposed changes that are incorporated will affect intermediate design phase submittals. The EPA CO must approve any proposed VE design changes for ARCS/RAC contractor RDs. USACE should inform the RPM of any incorporated VE design changes that affect the cost, schedule, or ROD requirements. Section 4.8.1 contains additional information on the VE study process.

Updated RA Schedule

The revised RA schedule should identify the timetable for initiating and completing all critical path tasks and major milestones. The schedule also should provide an accurate estimate of the RA completion date.

Intermediate RA and O&M Cost Estimates

As with the preliminary RA cost estimate, the intermediate RA cost estimate must include all costs necessary to arrive at a CWE. The estimate should be prepared with as much detail as the design documents allow. At the intermediate project stage, designs should be about 60 percent complete and design contingencies should be higher at this stage than for prefinal/final design project stages, but lower than for the preliminary design stage.

The intermediate RA cost estimate should be refined using flow sheets, layouts, and equipment details, and is expected to be accurate within plus 30 percent and minus 15 percent for simple projects and plus 40 percent and minus 20 percent for complex projects. The basis for unit prices should be provided with the estimate and should reflect current costs for labor, equipment, and materials. Vendor quotations should be included in the estimate when used.

As the design is refined, the actual O&M cost estimate also becomes more established. Anticipated O&M costs must be presented to the state as the information is made available.

Technical Review of the Intermediate Design

The intermediate design phase submittals must be reviewed for technical content and consistency with the ROD. The contracting party (EPA or USACE) is responsible for assuring that the intermediate design is reviewed for:

- Biddability, constructability, operability, claims prevention, and environmental screening (see **Appendix C**)

- Use of the most currently accepted pollution control measures and technology
- Use of currently accepted construction practices
- Spot-checking revised or newly submitted calculations to assess design quality

For EPA-managed RDs, the RPM collects all TRT comments and forwards them to the contractor. As specified in the SOW, the contractor reviews and formally responds to each comment. USACE site-specific contracts also require the contractor to respond to all review comments.

The RPM also must update CERCLIS as the RA cost estimate and schedule are refined. Updating and maintaining the information in CERCLIS facilitates effective communication between the RPM, PO, and CO and helps ensure that RA funds will be available as needed.

4.7.6 Prefinal/Final Design

The prefinal design is a draft version of the complete RD, including all drawings, specifications, reports, and attachments. All contracting party comments generated during the intermediate design review should be incorporated, all design work completed, and the RA contract documents finalized.

The contracting party must review and approve all prefinal design documents before requesting the final design from the contractor. After the contracting party has reviewed the prefinal design and the contractor has incorporated any additional comments, the contractor will submit the final Final design. The final design should be stamped and signed by licensed professional engineers involved in preparing and certifying the final engineering package. The certifications may include civil, mechanical, structural, electrical, and chemical engineering and registered geologist certifications.

Figure 4-12 outlines the major components of the prefinal/final design deliverable.

Final Design Criteria Analysis Report

The final design criteria analysis report generally should duplicate the contents of the intermediate design criteria analysis report incorporating revisions based on review comments. The USACE version of this report will be written in the past tense to indicate that the criteria were considered before design completion.

Figure 4-12

Prefinal/Final Design Phase Submittal Components

- Design criteria report
- Basis of design report
- Prefinal/final drawings and specifications
  - Complete specifications
  - Complete drawings and schematics
  - Construction QAPP
  - Draft O&M manual
  - Appendices
- RA solicitation package
- RA schedule
- Prefinal/final RA cost estimate

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Final Basis of Design Report

The final basis of design report generally should duplicate the contents of the intermediate basis of design report incorporating revisions based on review comments. Copies of all permit applications also must be included as part of the permits plan section of the report and access requirements finalized to incorporate changes since the intermediate report. The USACE version of the basis of design report, like the design criteria analysis report, will be written in the past tense.

Prefinal/Final Drawings and Specifications

The major generic components of the prefinal/final drawings and specifications listed in Figure 4-12 are described below.

Complete Specifications

The prefinal/final specifications should finalize the intermediate specifications and include final construction, installation, site preparation, and fieldwork standards, including an equipment startup and operator training plan. The complete specifications also must include a submittal register to identify all plans, documents, and construction submittal items that will be submitted by the constructor during the RA. All specifications shall conform to CSI format (USACE-managed RDs will follow the USACE ETL 1006, *Technical Requirement for Pre-design and Design Submittals* specifications).

Complete Drawings and Schematics

All drawings and schematics must be presented in final form. The types and number of drawings vary depending on the nature of the remedy. The drawings may include, but are not limited to:

- A drawing register listing each drawing and specification produced during the course of the project with current status indicated
- Facility representations, PFDs, and floor plans
- P&IDs
- A process control table
- Utilities drawings
- Grading and drainage controls
- A landscape plan
- A seeding and sodding plan and wetlands and revegetation plan
- A vicinity map
- Site characterizations, contour maps, and physical features
- Site work zones, designated safety zones, and site clearing activities
- Excavation plans
- Site layouts and demolition plans
- A flood control plan

Construction Quality Assurance Plan

A construction quality assurance plan (CQAP) must be prepared by the designer in accordance with the *Construction Quality Assurance Plan for Hazardous Waste Land Disposal Facilities* and submitted as part of the prefinal/final report. The CQAP is the plan that describes the QA tests necessary to ensure that the final product meets the design specifications. The tests are used to provide quantitative criteria with which to accept the final product. Construction QA is the responsibility of the contracting party and takes place throughout the construction process.

The CQAP, at a minimum, should contain the following elements:

- Lines of authority and responsibilities of all key personnel involved in the RA
- Construction QA personnel qualification requirements
- List of inspection activities, including the summary, scope, and frequency of the tests and observations used to monitor the RA and verify compliance with environmental requirements and customary construction practices, OSHA, building and safety codes, etc.
- List of sampling requirements
- All documentation requirements for reporting construction QA activities, including daily summary reports and inspection data sheets

Draft O&M Manual

The responsibilities for completing the O&M manual are shared between the designer and the constructor. The designer must prepare and submit a draft of the O&M manual during design. The designer completes its portion of the manual and provides a copy with the specifications. The RA constructor completes the manual during the RA phase of the project. The draft manual may contain the following (with the party responsible for completing each section indicated in parenthesis):

- Description of how the designer intends the facility to operate (*designer*)
- Description of normal O&M, including startup procedures, prescribed treatment or operation conditions, and schedule (*constructor*)
- Description of potential operating problems, including common or anticipated remedies and a useful life analysis of significant components that includes replacement costs (*designer and constructor*)
- QA plan for O&M, including a description of routine monitoring tasks, a description of required laboratory tests, required data collection reporting requirements (to EPA, USACE, the state, etc.), and the location and rationale of monitoring points (*designer*)
- Description of alternative procedures to prevent releases or threatened releases which may endanger health or prevent cleanup standards from being attained (*designer*)

- Description of the corrective action to be taken in the event of a release (*designer*)
- Safety plan, including a description of precautions, personal protective equipment (PPE) requirements, and the tasks required in the event of a safety systems failure (*designer and constructor*)
- Description of all installed equipment, including identification numbers, vendor data and submittals, monitoring components, site equipment, spare parts, and component maintenance and replacement schedules (*constructor*)
- Description of all record and reporting mechanisms required, including daily operating logs, laboratory records, for operating costs, mechanisms for reporting emergencies, maintenance records, and reporting requirements to the appropriate parties (*designer*)
- Final O&M cost estimate projected annually along with supporting documentation (*designer and constructor*)

Appendices

All pertinent data used in developing the design will be included as appendices. The list includes, but is not limited to:

- Calculations
- Chemical data
- Geotechnical data
- Applicable references

Complete RA Solicitation Package

The prefinal/final report must include the following RA contract documents:

- Solicitation/contract form
- Supplies or services and prices
- RA SOW
- Terms and conditions of the contract, including payments, delivery schedule, point of delivery, and acceptance criteria
- Method of procurement, including evaluation, basis, and method of awarding the RA contract
- Prevailing wage rates determination, in accordance with the Davis-Bacon Act or the Service Contract Act, and the wage rate expiration date
- Deadline and location for submitting bids/ offers
- All appropriate contract clauses

RA Schedule

The final RA schedule should detail the specific RA milestones and outline the estimated completion dates. The schedule also must include the estimated labor, equipment, and oversight resources required to complete each milestone as well as additional site-specific or contracting party schedule requirements.

Prefinal/Final RA and O&M Cost Estimates

As with earlier stage RA cost estimates, the prefinal/final RA cost estimate must include all costs necessary to arrive at a current working estimate. The estimate should be prepared with as much detail as the design documents allow. Since the design is more complete at this stage, design contingencies normally will be lower at this stage than for preliminary and intermediate design project stages. Cost allowances also should be significantly reduced at this stage. The prefinal/final RA cost estimate is expected to be accurate within plus 15 percent and minus 5 percent. The basis for all unit prices should be provided with the estimate, and should reflect current costs for labor, materials, and equipment. Vendor quotations should be included in the estimate when used. Cost risk analysis should be used for assignment of contingencies to accommodate any potential cost growth.

The RA cost estimate *cannot* be substituted for the IGCE when preparing the RA solicitation package because the IGCE is used for comparing and negotiating costs with the RA contractor. A contractor-prepared cost estimate cannot be used for this purpose (see section 5.2.5).

The final O&M cost estimate information is included as part of the materials submitted with the prefinal/final draft O&M manual.

Reviewing the Prefinal Design

The contracting party's TRT reviews the prefinal design phase submittal to ensure:

- Contractor completion of the plan-in-hand reviews and correlating drawings and specifications as detailed in the SOW (see section 4.3.1)
- Final biddability, constructability, operability, claims prevention, and environmental reviews (see **Appendix C**)
- Accuracy of the RA cost estimate, quantities of materials, etc.
- Use of currently accepted construction practices
- Use of the most currently accepted pollution control measures and technology
- Adequacy of the O&M plan and the CQAP
- Adequacy of site security and the RA health and safety specifications
- Compliance with local/national building and safety codes

4.8 Value Engineering During Remedial Design

VE is required for RDs because *FAR* Part 48 requires that federal contracts, with few exceptions, must include a clause providing for VE services. In addition to the *FAR* requirement, the Office of Management and Budget Circular No. A-131 requires the use of VE, when appropriate, in all federal departments and agencies to reduce nonessential procurement and program costs.

VE is an organized effort directed at analyzing the functions of systems, equipment, facilities, services, and supplies for the purpose of achieving the essential functions at the lowest life-cycle cost consistent with required performance, reliability, quality, and safety. VE during an RD is similar to classical design reviews but focuses on functionality and reducing the investment necessary to achieve the design function. VE can be applied during any phase of the project, but application during early phases of the RD produces the maximum benefit.

The VE process involves a VE screen, the use of a VE study team, and, possibly, a VE study. These procedures are discussed below.

4.8.1 VE Screen

The first step in VE for an RD is the VE screen. The contracting party must ensure that the schedule and budget for the RD allow for VE and should include VE redesign in the cost and budget contingencies. For USACE-managed RDs, USACE is responsible for VE activities, including the VE screen. For designs developed by an ARCS/RAC contractor, the RPM includes the VE screen in the WA SOW to ensure that it is conducted.

In the VE screen, the designer reviews the proposed process and identifies the potential high cost design elements or subsystems that may become candidates for a formal VE study. **Figure 4-13** highlights typical questions the designer should ask when conducting a VE screen. This task should be completed as early as possible, with the results of the VE screen presented in a formal report to the contracting party *with or before* submittal of preliminary design phase drawings and specifications.

The contracting party reviews the VE screen recommendations and determines if a VE study is necessary. When USACE is the contracting party, it should notify the RPM if a VE study will be performed and the effects that a study will have on the ROD, budget, and schedule. When EPA is the contracting party, the RPM should consult with the TRT to ensure that potential high costs or problem areas have been explored in the VE screen before authorizing a VE study.

4.8.2 VE Study Team

The VE team selected to conduct the VE study must be independent from the actual design team so that no VE study team member has a financial interest in the outcome. Studies may be conducted by a VE team from another federal agency, a VE consultant, EPA in-house personnel or, in certain situations, by the EPA contractor (ARCS/RAC). If the EPA contractor that is developing the design conducts the VE study, the CO must ensure that the contractor has an independent VE group within its organization and demonstrate that the contractor has made the decision to develop a quality product regardless of the effects on profit.

If the Regional EPA office has a VE program in place, this team may perform the study. Lacking an

Figure 4-13

Value Engineering Screening

The Society of American Value Engineers (SAVE) developed the following questions to identify design elements as candidates for a VE study.

- Is the item expensive?
- Is the item complex?
- Is it a high-volume item? Can a simple change in one item produce large savings in the total project?
- Does the item use critical materials?
- Is it difficult to construct?
- Does it have high O&M costs?
- Does it require specialized skills to construct or operate?
- Does it use obsolete materials and methods?
- Was the design rushed?
- Does it use traditional design?
- Is the competition producing the item at a lower cost?

In addition, several other questions should be asked:

- Does the design advocate using proprietary technology? (Royalties, which must be paid for proprietary technology, could be avoided by considering other options.)
- Will it require highly trained personnel to operate?
- Is the design treating everything using a single piece of equipment, when several pieces of equipment would be more cost-effective and efficient?
- Is the design using technology already proven in industry in similar (not necessarily in the hazardous waste field) commercial applications? (Look to chemical processing, oil refining, field production, etc.)
- Has the design used predesigned skids or equipment packages effectively?

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in-house team, the RPM should consult with the USACE VE study team chief engineer located in the Savannah, Georgia division office. If the RPM requests the USACE specialized VE team in advance, it may be able to conduct a timely review without adversely affecting the schedule.

All technical disciplines involved in the design must be represented on the team. Team members should have received the 40-hour VE training sponsored by the Society of American Value Engineers (SAVE) and the team leader should be certified by that organization. Adjunct members also may participate. EPA should not, however, pay for contractor personnel VE training. A representative from the designer should also be available.

4.8.3 VE Study

A VE study during an RD uses a prescribed methodology to address technical problems creatively and attempt to lower project capital or O&M costs. The typical VE study consists of six phases:

- Information—The VE team identifies and analyzes the function of each design element to be studied.
- Speculation—The creative phase of the process in which efforts are made to find a better way of performing a specified function.
- Analysis—Each idea is analyzed for function and potential cost benefit.
- Development—The ideas are developed in detail and the VE proposal is written. Development is limited to concept and potential cost savings. Potential cost savings account for the cost of redesign. No detailed design work is performed by the VE team during this phase.

- Presentation—An oral presentation based upon the written proposal is made. Team recommendations are presented to the decision-making body.
- Implementation—Incorporation of VE proposals in the design.

The first three phases of the VE study often occur during a week-long team meeting. The development phase may take an additional two to three weeks. The VE study team leader will provide the contracting party with redesign options and study recommendations.

The decision to incorporate the results of the VE study is made by the contracting party. Where USACE is the contracting party for the RD, USACE should consult with the RPM before making a decision to incorporate VE study results, especially when proposed design changes may affect the schedule or design costs. Where EPA is the contracting party, the EPA CO consults with the RPM and TRT and makes the decision to incorporate VE study results.

Office of Management and Budget (OMB) Circular A-131, May 21, 1993, requires federal departments and agencies to use VE where appropriate.

4.9 Post-Design Activities

Post-design activities include the preparation of the RA solicitation package (final drawings and specifications), advertising the solicitation in the *CBD*, holding a preproposal conference for all potential constructors, and issuing amendments to the solicitation package as necessary. The procurement process is addressed in more detail in section 5.4.

Prior to the initiation of the solicitation process by the contracting party, the RPM is responsible for completing the following activities:

- Obtaining the Superfund state contract (this must be signed by the state before EPA Headquarters releases RA funds for the site)
- Obtaining all site access/property for the RA
- Ensuring that the designer will be available during the RA to provide technical support
- Preparing the RA SOW and the IGCE
- Preparing the IAG or WA
- Revising the RA communications matrix
- Ensuring TRT availability
- Issuing an RD fact sheet (40 *CFR* 300.435)
- Making information available to the public, as appropriate, in a public availability session before RA initiation (40 *CFR* 300.435)